Southall Bros. & Barclay

(LIMITED)

SEVENTEENTH AND EIGHTEENTH LABORATORY REPORTS

(1908–1909).

BIRMINGHAM.

1910.

SEVENTEENTH AND EIGHTEENTH REPORTS

FROM THE

ANALYTICAL LABORATORIES

OF

SOUTHALL BROS. & BARCLAY

(LIMITED).

EDITED BY

E. W. MANN, PH.C., F.C.S.

BIRMINGHAM,

JANUARY, 1910.

CONTENTS.

PAGE

Preface 3

Crude Drugs, Fixed Oils, etc. 5

Olive Oil 14

Essential Oils 19

Chemical Preparations 27

Calamine 28

Galenical Preparations 32

Liquid Extract of Hydrastis 33

Spirit of Nitrous Ether 36

Table of Standards for Galenicals 39

" Standard " Powder Sets 46

Guarantee of B.P. Quality 47

Southalls' Materia Medica 48

PREFACE.

TO the numerous enquirers for what should have been our Seventeenth Annual Report, we have to tender our apologies for its non-appearance at the accustomed time.

Our readers will remember that the end of 1908 with us was marked by a destructive fire, the effects of which, although fortunately confined to one wing of the buildings, caused very great pressure on the entire staff during the early part of the year. Under these circumstances we felt it advisable to defer the publication of our usual resumé until the present time.

The following Report therefore presents the more interesting features of our analytical work during two years, a period in which the total number of samples submitted to examination has run well into five figures, and while by far the greater part of its pages are occupied by examples drawn from these records, we also publish an account of research work undertaken on special points of importance which have arisen.

Inter alia—the sections on Olive Oil, Liquid Extract of Hydrastis, Spirit of Nitrous Ether, Calamine, will, we hope, render our Report of interest and value to all interested in the practical problems of professional Pharmacy.

BIRMINGHAM,

January, 1910.

DATA.

Unless otherwise specified, the following data apply to all figures given in the following pages.

Specific gravity .. $d^{15\cdot5}_{15\cdot5}$°C.
Optical rotation .. degree of rotation, with sodium light, using 100 mm. tube.

Temperature in degrees centigrade.

Acid, Ester, Saponification values are equivalent in each case to the number of milligrammes of KHO required for 1 gramme of the substance, to neutralize the acid, saponify the Ester, or in the case of saponification to the sum of these two.

CRUDE DRUGS, FIXED OILS, WAXES, etc.

IN this section of our Report we have often drawn attention to the extreme variations in the proportions of active principle yielded by crude drugs, and we note with interest the importance attached to the subject at the Seventh International Congress of Applied Chemistry, held in London during the year.

Olive Oil has been a subject of very considerable anxiety during the last few months, owing to the prevalence of gross sophistication, and we give below figures obtained by the analysis of some adulterated oils which should prove of interest.

Aconite Root.—In our Fifteenth Report we drew attention to the low proportion of alkaloid yielded by samples containing much stem-crowned root, and stated our intention of making experiments on the relative proportions present in stem and bud-crowned roots. We have since been able to make some experiments on this point, and append the results obtained.

Three samples of foreign root and a cultivated root of English origin were air-dried, the individual roots in each classified as stem or bud-crowned, and the respective proportions determined. Each was separately ground, and the total ether-soluble alkaloid determined by the method of the U.S.P. and titrated as aconitine.

			ACONITINE
Foreign-grown root.—*A.*	Bud.	48%	0·47%
	Stem.	52%	0·24%
,, ,, *B.*	Bud.	48%	0·38%
	Stem.	52%	0·32%
,, ,, *C.*	Bud.	10%	not assayed
	Stem.	90%	0·45%
English-grown root.—	Bud.	100%	0·58%
	Stem.	nil	—

Whilst not absolutely conclusive, these results show that so long as no standard for aconitine in the root is required, the British Pharmacopœia restriction of the official drug to bud-crowned roots is fully justified. Incidentally, also, the superiority of English-grown root is demonstrated, and it appears advisable that the words "from plants cultivated in Britain" should be retained in the official definition.

Six further samples of foreign-grown root examined gave proportions of Aconitine varying from 0·28 to 0·57 per cent.

Aloes, Socotrine.—Twenty-one samples have been examined within the period under review, and show a great variation with regard to solubility in water. The figures obtained ranged from 17·2 to 49·7 per cent. and averaged 26·8 per cent., a result which can only be regarded as unsatisfactory.

Ammoniacum.—A sample of satisfactory appearance proved to yield 0·94 per cent. of ash and 63·04 per cent. matter soluble in alcohol (90 per cent.).

Two other samples were probably mixtures of Ammoniacum and Galbanum or African Ammoniacum, a pronounced umbelliferone reaction being obtained in each case.

Araroba.—Two samples proved of fairly satisfactory quality yielding 53·3 and 51·7 per cent. respectively to hot chloroform.

Beeswax, white.—Seven samples have been examined, and in no case could any exception be taken to the quality of the wax. The figures were :—

Specific gravity	0·9639 to 0·9670
Melting-point	62° to 64°
Acid value	19·94 to 24·03
Saponification value	96·90 to 99·77

Beeswax, yellow.—Fourteen samples in all have been subjected to analysis, and here again normal results have been obtained in every case.

Specific gravity	0·9590 to 0·9675
Melting-point	62° to 64°
Acid value	17·39 to 19·80
Saponification value	91·3 to 95·3

It will be observed that the " acid value " figures for yellow beeswax are distinctly lower than those obtained for the bleached variety.

Belladonna Root.—Six specimens of foreign-grown root have been assayed with results rather more uniform than those usually obtained. The actual figures resulting were 0·39, 0·47, 0·55, 0·44, 0·25 and 0·46 per cent. respectively of total alkaloids by titration.

Benzoin, Sumatra.—We have had occasion to examine some eleven parcels of this drug, using the methods published by us some years since (Report No. 11, p. 30, also *Chemist and Druggist*, March 15th, 1902). The figures obtained show a slight improvement as compared with recent years.

Solubility in 90 per cent. alcohol	61·00 to 74·20 per cent., average 66·4
Free Balsamic Acids, calculated as Benzoic Acid	7·28 to 10·12 per cent., average 8·60
Combined Balsamic Acids, calculated as Benzoic Acid	9·20 to 14·12 per cent., average 12·02

Cade, Oil of.—Three samples gave normal results when examined according to the methods of the British Pharmaceutical Codex, except as regards specific gravities, these being 1·022, 1·024 and 1·023 respectively. A further sample had specific gravity 1·055, and gave pronounced reactions for furfurol and catechol, pointing to the presence of ordinary wood tar or coal tar oils.

Cannabis Indica.—We have determined the proportion of total matter soluble in alcohol (90 per cent.) and of resin in six samples of Indian-grown drug. The results do not show any very great variation.

Soluble in 90 per cent. alcohol...	9·2 to 13·9	per cent., average	11·07
Resin	7·90 to 11·5	,, ,,	9·47

Capsicum.—Two samples of the official fruit yielded 15·4 and 14·0 per cent. respectively of matter soluble in benzol.

Carmine.—Determinations of ash, moisture, colouring power, etc., are made on this substance to secure freedom from sophistication. For the former two, the results obtained from seven samples were:—

Ash	3·05 to 8·39	per cent.
Moisture (at 100°C.) ...	10·53 to 15·70	,,

Carnauba Wax.—The only sample examined proved to be satisfactory. The figures obtained were:—

Melting-point	84°C.
Specific gravity	0·979
Saponification value	82·0

Cascara Sagrada.—A large number of parcels have been assayed for amount of extractive soluble in cold water. The results show a very considerable uniformity, the average varying but little from year to year.

Range, from 20·2 to 27·8. Average, 23·6 per cent.

Castor Oil.—For thirty-seven samples examined, the following range of results has been obtained :—

Specific gravity	0·961 to 0·965
Saponification value	180·1 to 184·2

In every instance the application of the official sulphuric acid test resulted in the formation of a distinct brown colour.

Ceresin.—Adulteration and substitution is very common in this article, much of the white variety offered is merely paraffin wax, while the yellow is often a compound of paraffin wax, colophony and possibly carnauba wax. Typical figures for a wax of this class were given by one sample.

Specific gravity	1·000
Saponification value	103·7

Charcoal, Wood.—We have experienced considerable difficulty in obtaining supplies of this article with a sufficiently small proportion of mineral matter to satisfy our requirements. The ash yielded by the seventeen samples examined ranged from 2·6 to 17·1 per cent. no less than nine of these exceeding the Pharmacopœia limit of 7·5 per cent.

Chaulmoogra Oil.—The only sample examined gave :—

Melting-point	25° to 27°
Saponification value	198·1
Iodine absorbed	103·0 per cent.

Cocoanut Oil.—Twenty-seven samples have been examined, all proving satisfactory. The range of figures obtained was :—

Specific gravity at 99°C. (Water at 15·5° =1·000)	0·868 to 0·874
Melting-point	24° to 27°
Saponification value	256·1 to 263·8

Cod Liver Oil.—We give below typical results obtained by the analysis of the "A 1" Oil manufactured by us in Norway in seasons 1908 and 1909. It is interesting to note how little is the variation between the two.

	1908.	1909.
Specific gravity ...	0·928	0·9275
Saponification value	189·7	188·1
Iodine absorbed ...	155·2 per cent.	153·7 per cent.
Free acid calculated as oleic acid ...	0·28 ,,	0·43 ,,
Unsaponifiable matter	1·47 ,,	1·46 ,,
Refractive index at 15·5°C.	1·4802	1·4805
Colour tests	Normal in each case.	

A sample offered to us as genuine Norwegian Oil gave very different results:—

Specific gravity	0.9274
Saponification value	189·9
Iodine absorbed	163·4 per cent.
Free acid calculated as oleic acid...	6·57 ,,
Unsaponifiable matter	1·13 ,,
Refractive index at 15·5°C. ...	1·4814
Colour tests ...	Abnormal, no purple colour being given with sulphuric acid.

Cotton-seed Oil.—Six samples of this oil tested gave quite satisfactory results:—

Specific gravity	0·921 to 0·924
Saponification value ...	192·0 to 196·5
Free acid calculated as oleic acid	0·06 to 0·19 per cent.

Copaiba.—Many samples of this article have passed through our hands in the two years, and of these several have been sorted out on account of giving pronounced colour reactions by the official tests. We append the figures obtained for the remainder noting the valuable confirmatory results afforded by the application of "Resin acid factor" (see Report No. 12, p. 14). The value of this figure in estimating the freedom of Copaiba from Gurgun balsam is emphasized by the figures we give for two samples of the latter:—

Specific gravity ...	0·996	0·985	0·995	0·992	0·995
Resin	51·21	65·27	57·97	63·10	61·25
Acid number ...	82·57	86·29	80·33	85·41	83·85
Ester number ...	18·60	8·12	10·25	8·15	17·06
Resin acid factor ...	0·70	0·76	0·72	0·74	0·73
B.P. colour reactions	faint violet	faint violet	faint violet	satis-factory	satis-factory

Specific gravity ...	—	—	—	0·975	0·977
Resin	54·16	57·04	55·28	57·08	57·75
Acid number ...	78·0	78·13	77·70	81·69	79·00
Ester number ...	8·00	8·19	7·70	7·68	8·85
Resin acid factor ...	0·69	0·73	0·71	0·69	0·73
B.P. colour reactions	satis-factory	faint violet	faint violet	faint violet	satis-factory

GURGUN BALSAM.—

Specific gravity	0·959	0·958
Resin	26·93	27·45 per cent.
Acid number	6·79	6·22
Resin acid factor ...	3·96	4·41
B.P. colour tests.. ...	Intensely violet.	Intensely violet.

Cubebs.—We find very great differences in the quality of commercial Cubebs, and accordingly find it necessary to submit samples to assay before taking into stock. The figures we give below show how great is the variation, and also how the samples fall into two distinct groups with regard to their yield to petroleum spirit:—

Petroleum spirit extract † :—

16·03 4·45 16·54 16·90 4·30 18·08 14·00 3·88 per cent.

Soluble in alcohol (90 per cent.) * :—

4·49 3·40 5·22 5·66 3·61 — — — ,,

† Dried over sulphuric acid.

* Determined after exhaustion with petroleum spirit.

Elemi.—Two samples of Manila Elemi gave the following results:—

Volatile at 100°	23·00,	24·41	per cent.
Acid value	15·8,	18·5	„
Saponification value	20·1,	23·7	„

Ergot.—Less variation than usual has been encountered in this drug as judged by the cold water extractive, the figures being for sixteen samples 16·9 to 24·4 per cent., and averaging 20·8 per cent.

Guaiacum Resin.—A single sample examined was soluble to the extent of 82·88 per cent. in alcohol (90 per cent.), and was free from colophony according to the U.S.P. test.

Henbane Leaves.—A sample of continental second year's biennial leaves gave 0·059 per cent. of total alkaloids by titration, an average figure for this drug.

Henbane, Indian.—We have assayed three samples of this drug offered to us from various sources, and find unusual variation in alkaloidal strength. Total alkaloid (by titration) 0·85, 0·22, 0·29 per cent.

Hydrastis.—Four samples of the rhizome assayed by the method of the U.S.P. have given the following satisfactory figures:—Hydrastine 3·81, 3·16, 4·18, 4·83 per cent.

We deal more fully with the question of Hydrastis and the fluid extract under Galenical Preparations.

Insect Powder.—We have again met with a sample of this powder evidently ground from a mixture of stalks and flowers, the admixture being readily detected by the application of *Durrant's* test. We give the results, and compare them with those obtained by the examination of a powder ground by ourselves from closed flowers. The latter gave 6·61 per cent. of oleo-resin of a yellowish colour, while in the former case the colour was dark-green, and the yield but 4·94 per cent.

Ipecacuanha. — Thirty samples have been assayed, using the method of the U.S.P., the average percentage of alkaloid obtained being 1·98, a figure somewhat higher than that noted in our last report.

Jalap. – Out of eleven samples assayed, four only have proved to contain sufficient resin to satisfy the Pharmacopœia requirements. The percentages obtained ranged from 6·30 to 12·80, giving an average of 8·47.

Kamala.—We still meet with gross mineral sophistication in this drug, one parcel yielding 35·93 per cent. of ash. In two others the proportion was 10·34 and 11·06 per cent. respectively.

Lupulin.—The only sample examined proved of quite satisfactory quality. Ash-yield was 10·28 per cent., and residue insoluble in ether 35·80 per cent.

Mace.—A single specimen of true Banda Mace yielded 28·6 per cent. to petroleum spirit and an additional 7·1 per cent. on subsequent exhaustion with ether, a method of testing recommended by *Holmes* as a means of distinguishing true from Bombay mace, the latter yielding about 30 per cent. to ether when treated as above.

Mustard.—Four samples of ground mustard showed :—

Ash	3·77 to 4·53 per cent.
Fixed Oil	34·51 to 37·42 ,,

Neatsfoot Oil.—Seven samples have been examined during the two years, no one of which gave results outside the usually accepted limits :—

Specific gravity	0·916 to 0·917
Saponification value ...	196·3 to 197·2
Iodine absorbed	67·8 to 71·6 per cent.

Nut Oil (Arachis Oil).—Two samples have been examined giving:—

Specific gravity	0·9165,	0·919
Saponification value ...	187·2,	192·1
Free acid calculated as oleic acid	0·30,	1·38

Arachidic acid was estimated in the latter of these samples 4·65 per cent., having a melting point of 72°, being isolated using *Archbutt's* modification of *Renard's* test.

Olive Oil.—The number of samples of this oil examined during the two years amounts to 171, this high figure being largely due to the prevalence of adulteration in this article.

The great bulk of the samples examined proved to be genuine olive oil, although, even with these, great differences are found in point of flavour, etc., and amount of free fatty acid present. For these oils the figures fall between the following limits:—

Free acid as oleic acid ...	0·11 to 17·8 per cent.
Saponification value ...	188·1 to 194·7
Iodine absorbed	78·3 to 84·4 per cent.

Seven other samples, representing seven casks of oil, proved to be grossly adulterated with arachis oil, and the history of a consignment of four of these is interesting, and well demonstrates the necessity for constant watchfulness and care on the part of the manufacturing chemist.

The oil was sent to us as "Guaranteed Genuine Olive Oil," and samples were, as usual, drawn from each cask and submitted to our analytical department for examination. Suspicion was aroused owing to the peculiar behaviour of the oils on exposure to cold, and while each sample answered the Pharmacopœia requirements perfectly, the application of *Archbutt's* modification of

Renard's test for arachis oil showed no less than 4·44 per cent. of arachidic acid melting at 72°, this proportion corresponding to 70 to 80 per cent. of arachis oil.

The suppliers of the article were communicated with, and in reply challenged the accuracy of our analysis, stating that the oil in question had been twice analysed by an eminent London expert and pronounced genuine. So sure were they of this that they invited us to submit a sample to this gentleman for analysis at their expense. His report was to the effect that the sample gave traces of arachidic acid and might contain 5 or 6 per cent. of arachis oil, due probably to absorption from the wood of a cask which had previously contained this oil.

Naturally, we declined to accept this lame explanation, the more so as a section cut through the wood of one of the casks showed it to be coated inside with glue, and to be altogether free from oil. Eventually the supplying house admitted that their analyst was mistaken, and withdrew the consignment.

In our opinion the case is one of great importance, as showing the necessity for rigid analytical examination of all supplies, and also, as incidentally demonstrating the hopeless inadequacy of the Pharmacopœia tests for Olive Oil. The complete data obtained for this particular mixture were as follows :—

Specific gravity	0·9172
Saponification value...	190·7
Iodine absorbed	86·33 per cent.
Arachidic acid (melting point 72°)...	4·44 ,,
Refractive index at 15·5°	1·4712

Three other casks from a different source have also been found to be adulterated with arachis oil, the proportion of arachidic acid isolated from one of these being 2·03 per cent., corresponding to about 40 per cent. of arachis oil.

Opium.—Six samples of Turkish Opium have given proportions of Morphine (B.P. process) ranging from 12·6 to 17·4 per cent. of the dry opium, and averaging 14·5. Moisture has varied between 20·3 and 26·7 per cent., averaging 23·7.

Palm Oil.—Four samples examined contained proportions of moisture varying from 1·54 to 3·96 per cent., and traces only of foreign solid impurities.

Peach or Apricot Kernel Oil.—Many samples of this oil have been tested during the past two years, and most of them have given normal results with the colour and other tests. One abnormal sample gave a distinctly brown colouration with the fuming nitric acid test, and proved to absorb 120·0 per cent. of iodine.

Peruvian Balsam.—The only sample examined proved to correspond satisfactorily with the official tests.

Ether residue (from 5 grammes) ...	2·89 grammes
Saponification value of this ...	223·9

Saffron.—A very large number of samples have been examined, and we have found the amount of moisture present to be frequently in excess of the 12·5 per cent. official limit, in one case amounting to as much as 17·3 per cent. Twenty-two per cent. of the samples contained mineral matter (calculated on the dry saffron) in excess of the 7 per cent. standard, although since 8·20 per cent. was the highest figure found, the adulteration, if any, was not serious in amount.

Scammony, Mexican.—Five samples of the root of *Ipomœa orizabensis* submitted under this name were assayed for total resin, and proved to contain from 14·48 to 20·80 per cent., giving as an average 16·5 per cent.

Scammony.—A specimen of "virgin" yielded 79·1 per cent. to ether, contained 4·94 per cent. of mineral matter, and formed a satisfactory emulsion with water. "Aleppo" Scammony proved in one instance to yield but 22·5 per cent. to ether.

Sesame Oil.—Four samples have been submitted to analysis during the two years, two of these giving very marked colour reactions for cotton-seed oil.

Spermaceti.—A large number of samples have been examined, and in no case were any abnormal results obtained:—

Melting point	44° to 47°
Saponification value	123·5 to 127·8

Sperm Oil.—Six specimens of "Arctic" Sperm oil have been examined, one alone of which was objected to as giving abnormal results probably due to added mineral oil. The figures obtained were:—

	NORMAL.	ABNORMAL.
Specific gravity	0·875 to 0·884	0·880
Saponification value ...	121·5 to 144·4	105·9
Iodine absorbed	80·70 to 90·74%	65·52%
Unsaponifiable matter ...	35·86 to 40·82%	46·95%
Fatty acids	57·20 to 63·74%	49·56%

A single sample of "Southern" Sperm oil gave figures falling within the above range for the normal "Arctic" oils.

Stavesacre Oil.—A batch of our own manufacture proved on assay to contain 2·34 per cent. of total alkaloids.

Styrax.—In our last Report we drew attention to the very poor quality of this drug on the market. As the result of examining thirteen samples, we are now able to report considerably better figures, although showing an extraordinary amount of variation. These of course refer to the crude drug :—

Soluble in 90% alcohol ...	60·40 to 77·08%	average 69·0%
Insoluble in 90% alcohol ...	0·90 to 6·60%	,, 2·6%
Free balsamic acid as benzoic...	1·10 to 2·32%	,, 1·7%
Combined balsamic acid as benzoic ...	5·40 to 16·0	,, 10·3%

Theobroma Oil.—Fourteen samples have been examined, all but one of which have given normal results, the one exception was objected to on account of the low iodine figure, viz., 32·1 per cent. In the remainder the results obtained were as follows :—

Saponification value ...	192·5 to 196·9
Iodine absorbed	34·2 to 38·7 per cent.

Tolu, Balsam of.—Eleven parcels of this balsam have been examined with the very satisfactory results appended :—

Soluble in 90% alcohol ...	74·40 to 92·00%	average 86·3%
Insoluble in 90% alcohol ...	0·64 to 7·04%	,, 2·1%
Free balsamic acid as benzoic...	7·32 to 14·98%	,, 9·4%
Combined balsamic acid as benzoic ...	13·20 to 23·35%	,, 17·9%

ESSENTIAL OILS.

THE Essential Oils, perhaps even more than the Fixed Oils, form a department in which adulteration is rife, and where the necessity for analytical control is very marked. The oils of Bergamot, Geranium, Orange, Citronella, Thyme, and Sassafras have provided interesting examples of this.

Aniseed.—Seven samples have been examined. Optical rotation was laevo in each case and ranged from –0·13° to –1·39°. In other respects, all the samples conformed with the requirements of the Pharmacopœia and were easily soluble in three volumes of alcohol (90 per cent.)

Bay.—Five samples have been assayed for phenols, one yielding but 50 per cent. was rejected as of unsatisfactory quality :—

Specific gravity ...	0·986 to 0·992,	0·956
Phenols	55 to 69 per cent.	50 per cent.

Bergamot.—With two exceptions, the oils examined have given quite satisfactory results, the figures obtained being :—

Specific gravity	0·881 to 0·886
Linalyl acetate	37·30 to 44·69 per cent.

As we have before found to be the case, but few of the samples form a clear solution with two parts of alcohol (80 per cent.)

Two other oils were objected to on account of low ester percentage, the results being :—

Specific gravity ...	0·874	0·879
Linalyl acetate ...	17·2 per cent.	30·1 per cent.

Camphor.—Although we find little synthetic camphor to be offered, in view of the prejudice against this article we continue to examine all purchases of camphor for optical activity. Two samples of the synthetic article gave specific rotations +1·2° and +1·3° respectively, for a 10 per cent. w/v solution in alcohol (90 per cent.)

Caraway.—The results obtained by the examination of four samples of English oil show remarkably little variation :—

Specific gravity... ...	0·910 to	0·914
Rotation...	+76·95° to	+78·85°
Distillate below 185° ...	7 to	13 per cent.
Distillate above 200° ...	48 to	51 ,,

Similarly the numerous foreign distilled oils show but little variation between themselves, although usually richer in Carvol than the English oils. The figures were :—

Specific gravity... ...	0·913 to	0·9195
Rotation...	+74·32° to	+77·25°
Distillate below 185° ...	2 to	5 per cent.
Distillate above 200° ...	56 to	68 ,,

A sample of Carvol tested gave a dextro-rotation of 59·39°, while a specimen of decarvolised oil, offered as "Carvene," showed specific gravity 0·853, rotation +100°, with 96 per cent. distilling below 185°.

Cinnamon.—We continue to find this oil to contain Cinnamic aldehyde in excess of the amount characteristic of a genuine distillate, and there seems to be little doubt that adulteration with synthetically-produced aldehyde is often practised.

Citronella.—Three samples have given quite satisfactory figures, the fourth however was undoubtedly sophisticated :—

	THREE SAMPLES.	ANOTHER.
Specific gravity	0·900 to 0·901	0·912
Optical rotation	−10·21° to −10·69°	+0·3°
Geraniol content	57·07 to 62·70%	50·84%

Coriander.—Three samples have been examined, the results obtained being normal in each instance:—

Specific gravity	0·871 to 0·875
Rotation	+9·96° to +10·20°

All were soluble 1 to 3 of alcohol (70 per cent.).

Cumin.—The three parcels of this oil tested proved to give quite satisfactory figures:—

Specific gravity	0·911 to 0·920
Rotation	+4·24° to +5·32°

Dill.—Numerous samples have been examined, the results in all cases falling within the usually accepted limits for genuine oil:—

Specific gravity	0·9095 to 0·922
Rotation	+72·50° to +75·25°

Eucalyptus.—A specimen of the citronellal containing oil of *Eucalyptus citriodora* gave on examination:—

Specific gravity	0·877
Rotation	+0·02°

Fennel.—As was noticed in our 1908 Report, we no longer have the difficulty formerly experienced in obtaining authentic parcels of Oil of Fennel. Two samples examined have given:—

Specific gravity	0·967	0·971
Rotation	+16·70°	+13·75°
Congealing point	+4°C.	+7°C.

Geranium (African).—The figures for five samples were:—

Specific gravity ...	...	0·891 to 0·898
Geraniol content	...	49·8 to 78·8 per cent.

Geranium (Turkish or Palmarosa Oil).—A large number of samples of this oil have been submitted to examination, with normal results in all cases except one, the figures for which bear a close resemblance to those reported in our 1908 issue.

	Normal Oils.	*Adulterated Sample.*
Specific gravity ...	0·889 to 0·894	0·973
Geraniol	78·1 to 95·6 %	57·24 %
In 3 vols. of 70 % alcohol	Soluble in all cases.	Not soluble.

Juniper.—The following figures determined for samples of commercial "Juniper Wood Oil" should be interesting:—

Specific gravity ...	0·865	0·872	0·873
Rotation	–26·25°	–27·00°	–27·79°
Refractive Index at 15·5°	—	1·4738	1·4736
Refractive Index at 15·5° of residue after distilling off 80 per cent. ...	—	1·4863	1·4822

For comparison, we append figures for five samples of Juniper Berry Oil, which we believe to be genuine:—

Specific gravity ..	0·876	0·870	0·864	0·865	0·865
Rotation . ..	-8·06°	-9·03°	-10·66°	-3·68°	-3·68°
Refractive index at 15·5°	—	1·4795	1·4766	1·4748	1·4747
Refractive index at 15·5° after distilling off 80 per cent. ..	—	1·5004	1·4934	1·4942	1·4936

Lavender.—Many samples of foreign Oil of Lavender offered are obviously and admittedly non-genuine. An ester percentage as low as 7·92 has been met with in oils of this class. In reputable samples forming clear solutions in three volumes of alcohol (70 per cent.), we have found from 26·98 to 38·90 per cent. of ester. A sample of English oil gave:—

Specific gravity	0·906
Ester as Linalyl Acetate	13·08 per cent.

Linalool.—A single sample of this alcohol gave:—

Specific gravity	0·870
Rotation	−10·76°

Nutmeg.—Four specimens of Nutmeg oil tested show a very considerable variation in physical properties:—

Specific gravity	0·880	0·896	0·903	0·880
Rotation	+24·38°	+5·28°	+17·72°	+22·40°

Orange.—Four specimens of oil of sweet Orange have been examined, three of which proved satisfactory, the fourth being condemned as not genuine:—

	NORMAL OILS.	ABNORMAL.
Specific gravity	0·8470 to 0·8503	0·854
Rotation	+95·00° to +97·40°	+74·90°

Peppermint.—We have again examined a very large number of oils of all varieties, the figures as usual varying between comparatively narrow limits:—

	ENGLISH.	AMERICAN.	JAPANESE.
Specific gravity	0·903 to 0·907	0·905 to 0·909	0·897 to 0·900
Menthyl acetate	5·48 to 7·79%	6·60 to 7·71%	7·81 to 10·26%
Free Menthol	53·75 to 60·43%	54·00 to 54·5%	49·40 to 54·03%

Pennyroyal (European).—Numerous samples have been examined, two of which were classed as abnormal on account of low specific gravity and rotation. The results were:—

	NORMAL.	ABNORMAL.
Specific gravity	0·9353 to 0·968	0·9166 to 0·922
Rotation	+14·6° to +22·75°	+2·45°

Petitgrain.—Five samples have been assayed, in no instance could any exception be taken to the oil. The figures were:—

Specific gravity	0·866 to 0·8895
Esters as Linalyl acetate ...	40·06 to 44·50 per cent.

All were soluble in 2 vols. of alcohol (80 per cent.).

Pine (Pinus Pumilio).—The results for four samples of the official Pine Oil were:—

Specific gravity	0·862 to 0·869
Rotation	−6·69° to −11·14°
Bornyl acetate	5·06 to 8·70 per cent.

Pine (Oil of Pinus Sibirica).—As we have before remarked, this oil is largely sold as Oleum Pini Sylvestis, the true oil of this name not being a commercial article. The figures obtained for four samples were:—

Bornyl acetate	30·75 to 37·45 per cent.
Rotation	−40·05° to −41·82°
Specific gravity... ...	0·905 to 0·914

Rosemary.—Nine samples have been examined, two of which were objected to on account of low specific gravity and lævogyrate action on polarised light. All were soluble in two volumes of 90 per cent. alcohol.

	NORMAL OILS.	ABNORMAL OILS.
Specific gravity	0·898 to 0·915	0·8895, 0·887
Rotation ...	+3·0° to +9·83°	−0·10°, −0·50°

Rue.—The only sample examined gave the following figures:—

Specific gravity	0·842
Rotation	−2·75°
Congealing point	5°C.

Sage.—A single sample gave normal results:—

Specific gravity	0·9255
Rotation	+9·25°

Solubility in alcohol (80 per cent.) 1 in 1.

Sandal Wood.—Considerable uniformity in properties has characterised the numerous samples of this oil examined. As before noted we find it necessary to employ a temperature of 20°C. in many cases to effect solution in 6 volumes of alcohol (80 per cent.):—

Santalol	90·89 to 98·57 per cent.
Specific gravity... ...	0·974 to 0·980
Rotation...	–16·25° to –18·60°

Sassafras.—A considerable number of parcels of this oil have been examined, results for the most part being satisfactory, one sample was objected to on account of low specific gravity, viz., 1·031.

Specific gravity	1·061 to 1·080
Rotation	+0·86° to +3·75°

Savin.—Three oils have been examined with the following results:—

Specific gravity ...	0·918	0·9065	0·9085
Rotation	+54·38°	+55·00°	+51·10°
Distillate below 200°	47 %	56 %	37 %
Saponification value	—	113·4	112·1

Owing to the fact that the figures obtained for the last two of these oils differed considerably from the standards usually laid down, they were referred to the distillers, a firm of the highest repute, who guaranteed them to be genuine distillates.

Thyme.—One only of the three samples of white oil of Thyme examined gave thoroughly satisfactory results:—

Specific gravity	0·894	0·900	0·924
Phenols ...	10·2	31·9	56·3 per cent.
Rotation ...	+2·05°	–1·15°	+0·85°

Turpentine.—We again find much variation in the rotation of turpentine oils examined, these ranging from +0·74° to +12·25° in oils shown to be genuine by fractionation and other tests.

Verbena (Lemongrass).—For normal oils we have found :—

Specific gravity	0·901 to 0·9032
Citral	73·0 to 79·5 per cent.

With satisfactory solubility in 3 vols. of 70 per cent. alcohol.

Several samples have been found not completely soluble in this proportion, and have given low percentages of Citral.

Wormseed, American.—Two samples of this oil gave satisfactory results :—

Specific gravity	0·966	0·9645
Rotation	–6·25°	–6·60°

CHEMICAL PREPARATIONS.

OWING to the absence of the natural variations obtaining in the two groups already dealt with, chemical preparations do not lend themselves so readily to the art of sophistication, and the analytical work with regard to them is rather concerned with the question of impurities, which although frequently of small interest commercially owing to their minute proportions, become of great importance in chemicals intended for the purpose of human consumption.

Acetic Acid, Glacial.—We experience great difficulty in obtaining parcels of this acid containing 99 per cent. of hydrogen acetate, 98 per cent. being the usual strength. We use the freezing point as a test of strength, employing a *Beckmann* apparatus and thermometer for its determination.

Ammonium Carbonate.—Samples of this article carefully freed from any effloresced matter have given as high as 97·52 per cent. of $N_3H_{11}C_2O_5$.

Antimony Sulphide (black).—As noted in our last Report, samples of this substance on the market do not show the excessive proportion of insoluble siliceous matter formerly occuring. During the two years we have found matter insoluble in hot hydrochloric acid to vary from 0·40 to 2·27 per cent. Arsenic present varied from 200 to 600 parts per million.

Antimony, Sulphurated.—No sample examined proved to be soluble in solution of sodium hydroxide, and all contained arsenic, the proportion present varying between 200 and 300 parts per million.

Antimony, Tartarated.—We have experienced much difficulty in obtaining this substance free from an excessive proportion of arsenic. Forty per cent. of samples examined have proved to contain over 40 parts per million.

Borax and Boric Acid.—We are glad to be able to note very considerable improvement in these articles with respect to Lead and Arsenic, in no instance has the proportion of the latter exceeded 4 parts per million.

Calamine.—Prepared Calamine, according to the Pharmacopœia of 1885, was native carbonate of zinc subjected to purification, and was required to be almost entirely soluble in dilute acids.

We have frequently met with parcels of Calamine diverging far from this description, and as a matter of interest to ascertain what was actually being sold as Calamine, we have recently procured samples from various sources and have subjected them to a fairly exhaustive analysis, with the results appended :—

SAMPLES ..	A.	B.	C.	D.	E.
	Parts per cent.				
Zinc as Oxide (ZnO) ..	39·23	28·24	13·46	4·05	nil
Loss on ignition	35·41	6·44	6·53	3·82	1·57
Insoluble in HCl ..	0·39	51·69	70·73	86·61	92·58
Soluble in HCl :—					
$Fe_2O_3+Al_2O_3$ ..	2·62	4·17	1·38	1·31	2·39
Calcium as Oxide (CaO)	1·09	3·96	6·95	3·31	1·21
Magnesium ,, ,, (MgO)	2·37	0·41	0·22	0·17	traces
Sulphur (as SO_3) ..	5·79	1·21	—	—	1·22

The greater part of the large amount of insoluble matter present in samples B, C, D, and E consisted of Barium Sulphate. Samples B and D also contained appreciable amounts of lead; as regards D, wholly as sulphate; but B also contained lead compounds soluble in dilute acid.

Sample A, in most respects notably superior to the remainder, proved to contain no less than 4·33 per cent. of Sodium Carbonate (Na_2CO_3), and 9·69 per cent. of Sodium Sulphate (Na_2SO_4).

Apparently the Calamine was an artificial one, prepared by precipitation and very improperly washed; the alkali present might easily prove irritating if the preparation were used for a skin lotion.

Calcium Phosphate has again proved in some cases to be contaminated with Arsenic, in one instance as much as 30 parts per million being detected.

Chromic Acid.—Samples of the "purified" acid have proved to contain from 77·5 to 84·9 per cent. of CrO_3, in one case 11·34 per cent. of sulphate as H_2SO_4 was present. A single specimen of the "commercial" product gave CrO_3 13·52 per cent.

Citric Acid.—We again find this to be one of the purest chemical products we have to examine. In testing a very large number of samples we have never found the amount of lead to exceed 5 parts per million, or of arsenic to exceed 0·5 per million.

Cocaine Hydrochloride.—We usually find the melting point of this salt to lie between 184° and 186°. A sample recently examined proved to melt almost sharply at 188·5°, and was perfectly satisfactory in other respects. It was considered to be of higher purity than that usually met with, and we note that the U.S.P. gives a melting point of 189·9°.

Glycerin.—One sample only proved to contain any appreciable quantity of Arsenic, this being half-white quality and containing 10 parts per million.

Iron, Reduced.—Two samples examined have proved quite satisfactory, giving 86·73 and 91·40 per cent. of metallic iron, and containing 40 and 45 parts of Arsenic per million respectively.

Potassium Oxalate (neutral).—We have again met with this substance largely contaminated with compounds of lead.

Potassium Bitartrate.—A further two years' experience of Cream of Tartar enables us to confirm the remarks made in our Sixteenth Report, in but few instances has the amount of real bitartrate in samples offered fallen below 99-100 per cent. A sample showing 93·5 per cent. when assayed by incineration and titration of resulting K_2CO_3, proved to contain 0·96 per cent, of sulphate as $H_2\ SO_4$.

Arsenic has in no case been present in excess of 1 part per million, and the maximum amount of lead in any sample has been 10 parts per million.

Soap, Hard.—A considerable number of samples of the Sapo durus on the market have been examined, and while the greater number give results consistent with their preparation from olive oil, in three instances this was not so.

	SOAPS WHOLLY OR LARGELY OF OLIVE OIL BASIS.	SOAPS MADE FROM OTHER BASES.
Mean molecular weight of fatty acids	271·5 to 286·5	254·6 to 291·8
Iodine absorbed by mixed fatty acids	76·0 to 82·37%	47·20 to 65·7%

Strontium Carbonate.—Lead has again been met with in considerable quantity in a sample of this substance.

Sulphur, Precipitated.—We have experienced a recrudescence of arsenical contamination in precipitated Sulphur. Nearly 20 per cent. of the large number of samples examined have been rejected on this account, the amount of Arsenic in some being as high as 250 parts per million.

Sulphur, Sublimed.—In contrast with the precipitated variety, sublimed sulphur rarely contains any appreciable amount of Arsenic, 0·5 part per million being the maximum observed during the last two years. Excessive acidity is sometimes met with, in one case as much as 0·18 per cent. calculated as H_2SO_4 was present.

Tartaric Acid.—Although not so pure an article as Citric Acid, Tartaric Acid does not appear to be subject to the excessive metallic contamination observed at one time. Sixteen parts per million of Lead and 3 parts per million of Arsenic are the maxima noted during the past two years.

Zinc Oxide.—We have again to note that the lower grades of this substance are unfit for pharmaceutical use, Arsenic and Lead being frequently present in excessive proportions.

GALENICAL PREPARATIONS.

IN continuance of our endeavour to provide standards for those of the Pharmacopœia Galenicals containing definite principles capable of isolation and estimation, we have done a considerable amount of research work on Hydrastis and the liquid extract, the results of which are given below.

A series of experiments made on Spiritus Aetheris Nitrosi should also prove of interest to the retail pharmacist.

Belladonna, Green Extract.—We have frequently drawn attention to the great variation in alkaloidal strength of this extract. In our sixteenth Report we showed that our extract of season 1907 yielded 1·57 per cent. of total alkaloids by titration. The carefully bulked extract of season 1908 gave 0·98 per cent., of season 1909, 0·95 per cent. ; these figures being approximately 40 per cent. below that of 1907.

From other English sources, Belladonna extracts have given from 0·73 to 1·03 per cent. during 1908-9. A foreign sample offered possessed a brilliant green colour, the colouring matter proved to be readily soluble in water, and a few experiments showed it to possess the characters of an aniline dye.

Camphorated Oil.—We continue to assay every batch made, adopting 21·0 per cent. w/w as a minimum standard.

Cannabis Indica, Extract of.—Having received complaints that the extract was not wholly soluble in alcohol (90 per cent.), the matter was investigated, and this was found to be the case. Since the herb had been carefully extracted with alcohol of the correct strength, the insolubility observed must have been due either to alteration of the extract by heat, or to the extraction of sparingly soluble constituents by long continued percolation. Washing the extract with water would possibly remove the difficulty and obviate future trouble (*See also* Year Book of Pharmacy 1902, p. 220).

Cinnamon Water.—A bottle of Cinnamon Water which had been distilled some little time contained numerous well defined crystals, and as a matter of interest they were separated, dried and examined. The melting point was quite sharp at 133°C, and the crystals gave all the characteristic reactions for Cinnamic Acid.

Hydrastis, Liquid Extract of.—Hitherto we have standardised this liquid extract for extractive matter only, but during the past two years we have carried out an investigation with a view to formulating a standard for the preparation in terms of Hydrastine, the alkaloid to which the characteristic properties of the drug are attributed.

At the outset, we made a comparison between the assay methods of the German and United States Pharmacopœias; we found that the results obtained were practically in agreement, but have adopted the latter method as being far more rapid and easy in working; we have also found it to give concordant results. We have examined five samples of the fluid extract for specific gravity, total solid matter, alcoholic strength, and Hydrastine, and the results obtained are given in the table below.

Four of the samples (A, B, C, D) were obtained from first-class manufacturing houses, the fifth (E) was prepared on the large scale in our own laboratory.

SAMPLES ..	A.	B.	C.	D.	E.
Specific gravity	1·0155	1·0340	1·0249	1·0364	1·0381
Total solids w/v	16·73%	20·92%	20·94%	23·39%*	21·61%
Alcohol by vol.	37·36%	34·74%	36·96%	39·92%	34·16%
Hydrastine w/v	1·39%	2·01%	2·02%	1·27%	1·90%

The parcel of Autumn-collected rhizome from which sample E was prepared, after grinding and bulking, yielded on assay, 3·46 per cent. of Hydrastine.

The results obtained for percentage of Hydrastine show an amount of variation so marked as to emphasize the necessity for an official standard for this galenical, and it would appear from the figures given that the standard of 2·0 per cent. w/v imposed by the U.S.P. might, without undue stringency, be applied to the B.P. preparation. The German Pharmacopœia requires a standard corresponding to about 2·1 per cent. w/v.

It will be seen that samples A and D stand apart from the others by reason of their low proportion of Hydrastine, and the glycerin used in the preparation of D has not apparently facilitated the extraction of the drug. It may be noted that Fluidextractum Hydrastis U.S.P. contains about 10 per cent. of glycerin.

In making these experiments, we could hardly fail to notice the great discrepancy between the proportion of Hydrastine contained in the rhizome and that found in the fluid extract. On account of the enhanced value of Hydrastis, the matter is one of some importance, and investigations on the subject were continued, with a view to finding the cause of the discrepancy. In the first place 200 cubic centimeters of liquid extract were prepared with very great care from the powder used in making sample "E" above and on assay the following figures were obtained :—

Specific gravity	1·0368
Total solids w/v	22·14 per cent.
Hydrastine w/v	2·06 ,,

---

*This is an approximate figure, as this sample was proved to contain glycerin.

Some slight improvement was manifested here, but a large loss still appeared. This small batch of extract yielded a very considerable deposit, which was well drained and then treated with 100 c.c. of alcohol, 45 per cent. On assay the clear liquid was found to contain 0·42 grammes of alkaloid, equivalent to 0·21 per cent. additional on the original liquid extract.

A source of loss of an amount of alkaloid equal to 10 per cent. is here shown, and experiments were put in hand with a view to finding if possible a more favourable strength of alcohol as a menstruum.

The powdered rhizome used in this series was found to contain 2·55 per cent. of Hydrastine.

Liquid extracts were prepared according to the official method, using alcohol of 90, 70 and 60 per cent. respectively, and on assay the following figures were obtained :—

	LIQUID EXTRACT PREPARED WITH		
	90%	70%	60%
Specific gravity ...	0·9215	0·9941	1·0211
Total solids w/v ...	17·32%	22·09%	22·00%
Hydrastine w/v ...	1·65%	1·68%	1·60%

With the "90%" sample, exhaustion was proved practically complete by percolating 100 grammes of the marc with ammoniated alcohol, 500 c.c. extracting but 0·013 grammes more Hydrastine.

While it is true that the preparation with 70 per cent. alcohol yields better results, a considerable loss is still apparent, and it was thought that the potassium iodide used in the U.S.P. assay process might have the effect of throwing down some of the Hydrastine. This was disproved by using the process on a solution of pure Hydrastine in spirit, theoretical results being obtained.

It is evident from our experiments that a fluid extract prepared with any of the alcoholic media of the Pharmacopœia does not fully represent an equivalent of the drug.

Also that while part of the loss is due to alkaloid present in the large deposit and soluble in additional menstruum, the greater part of the loss of alkaloid may we think be due to the action of heat in distilling and evaporating the percolates.

Incidentally the Hydrastis used in the second portion of these experiments was assayed by *Maben's* process (Year Book of Pharmacy, 1901, p. 408), and found to yield :—

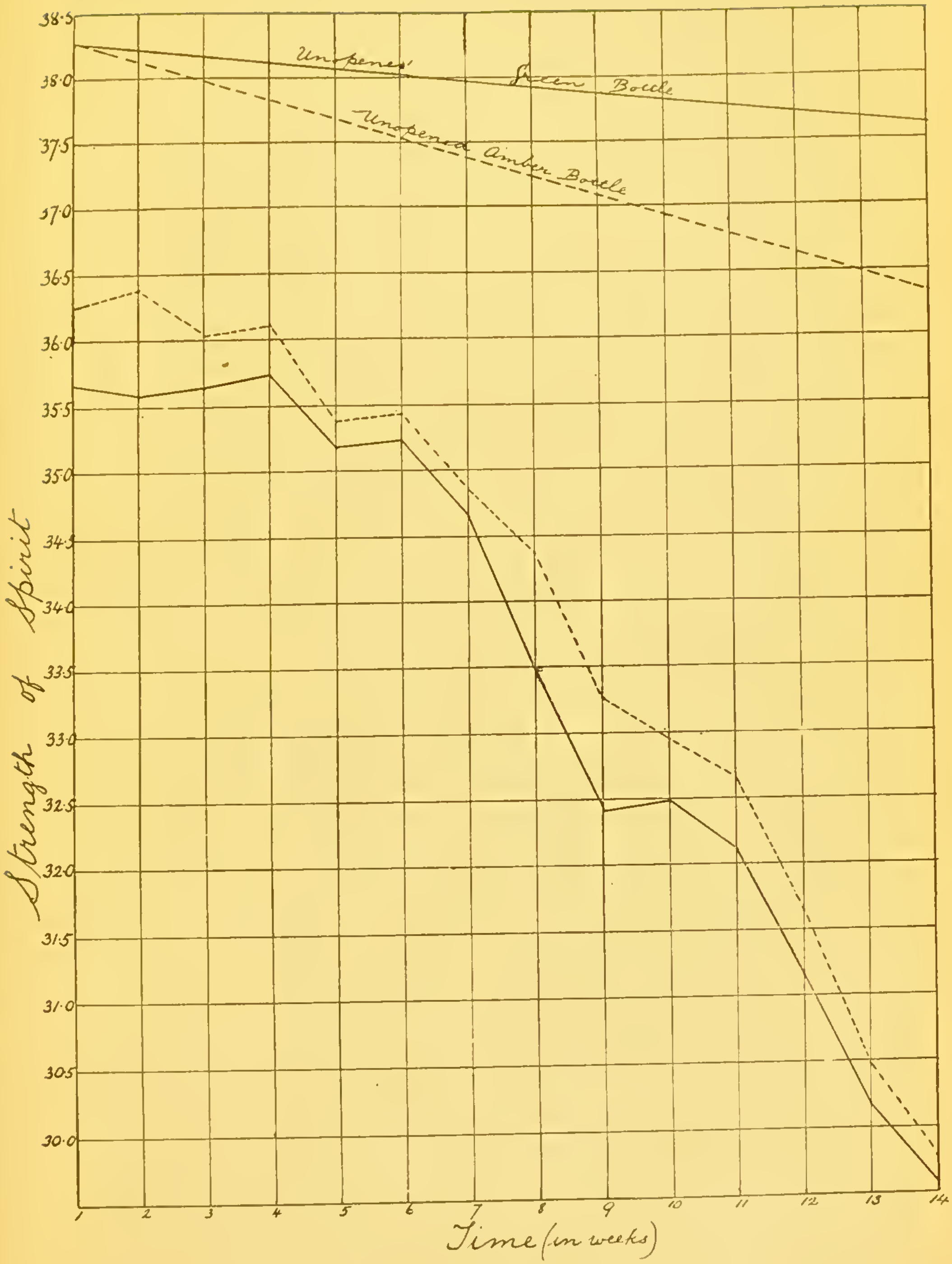
Berberine	2·95 per cent.
Hydrastine	2·20 ,,

Spirit of Nitrous Ether.—During 1908, a bench of magistrates, in connection with a prosecution under the Food and Drugs' Acts, recommended wholesale houses to send out Spirit of Nitrous Ether in amber bottles, the underlying idea being, we presume, that the loss of ethyl nitrite was due to hydrolysis rather than to volatilisation, and that this hydrolysis was aided by the actinic rays of light.

In order to obtain some definite experimental evidence on this point, we assayed a quantity of the spirit and filled from it four well-stoppered pint bottles, two amber and two of the familiar pale-green glass. All were placed on a shelf, and received a little direct sunlight during the last three months of the year. One bottle of each kind remained unopened until the conclusion of the experiment, while from the others there was weekly drawn into a measure, one fluid ounce of the spirit.

This spirit so withdrawn was immediately assayed, and at the end of fourteen weeks the remaining bottles, hitherto unopened, were assayed.

All results were corrected to 15·5°C. and 760 mm. pressure, and are shown graphically by the following curves :—


Unopened Green Bottle
Unopened Amber Bottle
Strength of Spirit
38·5
38·0
37·5
37·0
36·5
36·0
35·5
35·0
34·5
34·0
33·5
33·0
32·5
32·0
31·5
31·0
30·5
30·0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Time (in weeks)

The broken line in each case represents the spirit contained in amber bottles.

Strength of spirit is expressed in volumes of nitric oxide per five volumes of spirit, and the time is divided into weekly intervals.

It is clearly shown by these curves that the loss of ethyl nitrite depends for the most part on volatilisation rather than on hydrolysis, and that the influence of the colour of the bottle is a negligible factor in the result.

The diagram also shows how much more rapid the loss becomes as the bottles become emptied.

A few further experiments on this question showed how rapidly Spirit of Nitrous Ether loses strength when exposed in open vessels, and how great is the influence of temperature.

One fluid ounce exposed in an ordinary conical ounce measure at 18°C. lost 42 per cent. of its ethyl nitrite in 30 minutes, and 67 per cent. in an hour.

Four fluid ounces in a four-ounce measure at 11°C. lost but 4 per cent. in 30 minutes, and 20 per cent. in an hour, the temperature meanwhile having risen somewhat.

Several other experiments made in cylindrical vessels with a measured area of surface, showed the loss to be influenced to a far greater degree by temperature than by area of surface exposed.

TABLE

SHOWING SUGGESTED STANDARDS, RANGES
OF SPECIFIC GRAVITY, ETC.,
FOR

GALENICAL PREPARATIONS.

Name of Preparation.	Range of Specific Gravity.	STANDARD. (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume (of Alcohol.	REMARKS.
Acetum Cantharidis	1·066 to 1·072			
,, Ipecacuanhæ	0·991 to 0·993	3·62 HA. 0·1 total alkaloid	11 to 12·5	
,, Scillæ	1·035 to 1·040	8·0 4·0 acetic acid		
Collodium	0·775 to 0·782	2·0		
,, Flexile	0·790 to 0·797	6·5		
Decoctum Aloes Compositum	1·001 to 1·004	5·6	16 to 17	
,, Granati Corticis Conc.		30·0		
,, Hæmatoxyli Conc.		3·0		
Extractum Belladonnæ Liquidum	0·896 to 0·912	*0·75 total alkaloid	72·0 to 75·0	
,, ,, Viride		1·0 total alkaloid		
,, Cascaræ Sagradæ Liquidum	1·070 to 1·080	26·0	17·0 to 18·0	
,, Cimicifugæ Liquidum	0·890 to 0·900	12·5	74 to 78	
,, Cinchonæ Liquidum	1·115 to 1·150	*5·0 total alkaloid	10·5 to 12·0	
,, Cocæ Liquidum	1·004 to 1·014	0·5 total alkaloid	45·5 to 49·5	
,, Colocynthidis Compositum†		20 ether soluble		
,, Ergotæ Liquidum	1·020 to 1·027	15·0	31·5 to 32·5	
,, Filicis Liquidum	1·000 to 1·019			
,, Glycyrrhizæ Liquidum	1·140 to 1·150	42·0	16·0 to 18·0	
,, Hamamelidis Liquidum	1·025 to 1·050	21·0	33 to 34	
,, Hydrastis Liquidum	1·025 to 1·040	2·0 hydrastine	37·5 to 38·5	
,, Hyoscyami Viride		0·1 total alkaloid minm.		
,, Ipecacuanhæ Liquidum	0·885 to 0·910	*2·00 to 2·25 total alkaloid	75·0 to 79	
,, Jaborandi Liquidum	1·020 to 1·040	20·0	33 to 34	
,, Jalapæ		20 resin insoluble in ether		
,, Nucis Vomicæ Liquidum	0·950 to 0·970	*1·5 strychnine	57·5 to 61·5	
,, Opii Liquidum	0·985 to 0·990	*0·75 morphine	17·5 to 18·5	

Extractum Pareiræ Liquidum	1·050 to 1·065	22·5	20 to 22
,, Sarsæ Liquidum	1·080 to 1·090	20·0 (without Glycerine)	15 to 17
,, Strophanthi ‡		4·0 strophanthin	
,, Taraxaci Liquidum	1·070 to 1·090	25·0	16 to 20
Glycerinum Acidi Borici	1·345		
,, ,, Carbolici	1·230		
,, ,, Tannici	1·288 to 1·292		
,, Aluminis	1·288 to 1·292		
,, Boracis	1·280 to 1·295		
,, Pepsini	1·190 to 1·200	1 fluid dr. should dissolve 12,000 grains hard boiled white of egg.	
Infusum Aurantii Conc.		10·2	
,, ,, Compositum Conc.		7·2	
,, Buchu Conc.		6·0	
,, Calumbæ Conc.		3·5	
,, Caryophylli Conc.		5·0	
,, Cascarillæ Conc.		2·0	
,, Chiratæ Conc.		4·5	
,, Cinchonæ Acidum Conc.		1·0 total alkaloid	
,, Cuspariæ Conc.		8·0	
,, Digitalis Conc.		1·6	
,, Gentianæ Compositum Conc.		6·0	
,, Krameriæ Conc.		8·0	
,, Lupuli Conc.		7·0	
,, Quassiæ Conc.		0·25	
,, Rhei Conc.		10·0	
,, Scoparii Conc.		15·0	
,, Senegæ Conc.		10·0	
,, Sennæ Conc.		14·0	
,, Serpentariæ Conc.		4·5	
,, Uvæ Ursi Conc.		10·0	
Linimentum Aconiti	0·865 to 0·875	0·25 total ether soluble alkaloid	78·0 to 80·0
,, Belladonnæ	0·880 to 0·900	*0·375 total alkaloid	69·0 to 72·0

---

* Officially Standardized, † Scammony resin ‡ *P.J.*, 1898 (2), p. 665.

Name of Preparation.	Range of Specific Gravity.	**STANDARD.** (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	REMARKS
Linimentum Camphoræ	0·924 to 0·927	21·5 camphor		
,, ,, Ammoniatum	0·866 to 0·872		57·0 to 58	
,, Saponis	0·895 to 0·900		62 to 64·0	
Liquor Calumbæ Conc.	0·990 to 0·996	4·25	19·0 to 21·0	
,, Chiratæ Conc.	1·000 to 1·010	5·5	18·0 to 19·0	
,, Cusparæ Conc.	1·005 to 1·015	10·0	18·0 to 19·0	
,, Hamamelidis	0·980 to 0·985		16·0 to 18·0	
,, Iodi Fortis	1·010 to 1·025	11·5 iodine	76·0 to 77·0	
,, Krameriæ Conc.	1·015 to 1·025	10·0	18·0 to 19·0	
,, Picis Carbonis	0·855 to 0·865	2·5		
,, Quassiæ Conc.	0·975 to 0·980	0·30	18·0 to 19·0	
,, Rhei Conc.	1·020 to 1·030	12·5	18·0 to 19·0	
,, Sarsæ Compositus Conc	1·030 to 1·040	15·0	18·0 to 20·0	
,, Senegæ Conc.	1·015 to 1·025	12·5	18·5 to 22·0	
,, Sennæ Conc.	1·040 to 1·060	17·5	18·0 to 19·0	
,, Serpentariæ Conc.	0·990 to 1·000	5·0	18·0 to 19·0	
Mistura Sennæ Co.	1·110 to 1·118	16·5	14·4 to 16·6	
Oxymel	1·320*	4·4 acetic acid		
,, Scillæ	1·320*	2·0 acetic acid		
Pulv. Glycyrrhizæ Comp.		9·0 sulphur		
,, Rhei Comp.		68 to 70 ash		
Succus Belladonnæ	0·980 to 0·990		18·0 to 22·0	
,, Conii	0·980 to 0·990		18·0 to 22·0	
,, Hyoscyami	0·980 to 0·990		18·0 to 22·0	
,, Scoparii	0·980 to 0·990		18·0 to 22·0	
,, Taraxaci	0·995 to 1·000			
Syrupus Aromaticus	1·148 to 1·156			
,, Aurantii	1·270 to 1·280			
,, Calcii Lactophosphatis	1·310 to 1·320			
,, Cascaræ Aromaticus	1·110 to 1·125			

*

Syrupus Chloral	1·315 to 1·320		
,, Codeinæ	1·320 to 1·328	[each fluid dr	
,, Ferri Phosphatis	1·270	*Fe$_3$ (PO$_4$)$_2$—1 gr. in	
,, ,, Phos. c. Quin. et Strych.	1·275 to 1·285		
,, Glucosi	1·363 to 1·370		
,, Hemidesmi	1·325 to 1·330		
,, Limonis	1·290 to 1·300		
,, Pruni Virginianæ	1·300 to 1·320		
,, Rhei	1·310 to 1·320		
,, Rosæ	1·325 to 1·330		
,, Scillæ	1·330 to 1·335		
,, Sennæ	1·280 to 1·290		
,, Tolutanus	1·330 to 1·335		
,, Zingiberis	1·300 to 1·310		
Tinct. Aconiti	0.890 to 0.897	0·02 total ether soluble alkaloid	68·0 to 70·0
,, Aloes	0·970 to 0·985	8·5	38·0 to 41·0
,, Arnicæ	0·890 to 0·894	0·6	68·8 to 69·8
,, Asafetidæ	0·914 to 0·920	10·0	56·0 to 62·0
,, Aurantii	0·880 to 0·890	2·0	72·5 to 76·0
,, Belladonnæ	0·912 to 0·920	*0·05 total alkaloid	60·0 to 61·0
,, Benzoini Comp.	0·900 to 0·905	About 5·0 total balsamic acids, of which about 2·0 are free and 3·0 combined.	68·5 to 72·5
,, Buchu	0·930 to 0·935	4·0	56·0 to 57·0
,, Calumbæ	0·920 to 0·925	1·0	56·0 to 58·0
,, Camphoræ Comp.	0·915 to 0·920	*0·05 morphine	56·0 to 59·0
,, Cannabis Indicæ	0·844 to 0·850	4·0	83·0 to 86·0
,, Cantharidis	0·835 to 0·838	0·25	87·0 to 89·0
,, Capsici	0·890 to 0·897	1·50	67·5 to 69·5
,, Cardamomi Comp.	0·945 to 0·950	6·50	54·0 to 56·0
,, Cascarillæ	0·900 to 0·905	1·6 resin	62·5 to 67·5
,, Catechu	0·972 to 0·978	14·5	51·0 to 53·0
,, Chiratæ	0·920 to 0·924	0·8	56·0 to 58·0
,, Chloroformi et Morph. Comp.	1·010 to 1·020		52·0 to 54·0

* Officially Standardized.

Name of Preparation.	Range of Specific Gravity.	STANDARD. (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	Remarks.
Tinct. Cimicifugæ	0·922 to 0·928	2·0	57·0 to 59·0	
,, Cinchonæ	0·915 to 0·925	*1·0 total alkaloid	63·0 to 64·5	
,, Cinchonæ Comp.	0·915 to 0·921	5·00 *0·5 total alkaloid	62·0 to 68·0	
,, Cinnamomi	0·900 to 0·904	2·4	66·0 to 68·0	
,, Cocci	0·950 to 0·955	2·5	42·0 to 44·0	
,, Colchici Seminum	0·945 to 0·955	0·10 total alkaloid	42·0 to 44·0	
,, Conii	0·895 to 0·900	0·09 total alkaloid	66·0 to 68·5	
,, Croci	0·924 to 0·928	3·00	56·0 to 58·0	
,, Cubebæ	0·840 to 0·845	2·0 oleo-resin	83·0 to 85·0	
,, Digitalis	0·928 to 0·934	3·6	53·0 to 57·5	
,, Ergotæ Ammon.	0·932 to 0·939	4·0	48·0 to 52·0	
,, Ferri Perchlor	1·085 to 1·088		18·0 to 21·0	
,, Gelsemii	0·917 to 0·925	0·025 total alkaloid	57·0 to 59·0	
,, Gent. Comp.	0·964 to 0·968	5·0	42·5 to 43·5	
,, Guaiaci Ammon.	0·894 to 0·900	15·0	69·0 to 71·0	
,, Hamamelidis	0·950 to 0·954	2·0	42·0 to 44·0	
,, Hydrastis	0·920 to 0·926	2·5	56·0 to 58·0	
,, Hyoscyami	0·950 to 0·965	0·008 total alkaloid	40·5 to 42·5	
,, Iodi	0·878 to 0·882	*2·5 iodine	84·0 to 86·0	
,, Jaborandi	0·950 to 0·960	0·048 total alkaloid	42·0 to 44·0	
,, Jalapæ	0·905 to 0·910	*1·5 resin	65·0 to 67·0	
,, Kino	0·992 to 0·996	5·0 kino-tannic acid	43·0 to 44·5	
,, Krameriæ	0·934 to 0·938	5·0	56·0 to 58·0	
,, Lavand Comp.	0·836 to 0·840	0·6	86·5 to 88·5	
,, Limonis	0·880 to 0·888	2·0	67·5 to 71·5	
,, Lobeliæ Æther	0·810 to 0·816	0·07 lobeline	58·0 to 60·0	
,, Lupuli	0·930 to 0·940	4·0	54·0 to 57·0	
,, Myrrhæ	0·850 to 0·855	5·6	84·0 to 86·0	
,, Nucis Vomicæ	0·910 to 0·914	*0·25 strychnine	58·0 to 64·0	

Tinct. Opii	0·955 to 0·960	*0·75 morphine	40·0 to 44·0
,, Opii Ammon.	0·895 to 0·900	*0·113 morphine	60·0 to 63·0
,, Podophylli	0·850 to 0·855	3·65 resin	84·5 to 89·0
,, Pruni Virg.	0·930 to 0·938	3·0	52·0 to 57·0
,, Pyrethri	0·895 to 0·900	2·25 (0·22—0·36)	66·0 to 69·0
,, Quassiæ	0·944 to 0·948	0·05 quassin	42·0 to 44·0
,, Quillaiæ	0·918 to 0.924	1·25	56·0 to 58·0
,, Quininæ	0·885 to 0·895		72·5 to 76·0
,, ,, Ammon.	0·925 to 0·928		53·0 to 54·0
,, Rhei Comp.	0·970 to 0·975	4·50 (Exclusive of Glycerine)	51·0 to 53·0
,, Scillæ	0·955 to 0·962	10·0	52·0 to 54·0
,, Senegæ	0·935 to 0·938	6·5	55·0 to 57·0
,, Sennæ Comp.	0·985 to 0·994	10·00	38·5 to 40·5
,, Serpentariæ	0·896 to 0·900	2·00	66·0 to 68·0
,, Stramonii	0·950 to 0·964	0·04 total alkaloid	42·0 to 44·0
,, Strophanthi	0·892 to 0·895	0·2 strophanthin	67·0 to 69·0
,, Sumbul	0·895 to 0·900	2·5	66·0 to 69·0
,, Tolutana..	0·860 to 0·865	about 3 balsamic acids $\frac{1}{3}$ of which are free	80·0 to 82·0
,, Valerianæ Ammon.	0·935 to 0·942	3·0	50·0 to 54·0
,, Zingiberis	0·835 to 0·840	0·4	88·5 to 89·5
Vin. Colchici	1·010 to 1·015	7.0	
,, Ferri		0.40 total Fe.	

---

* Officially Standardized

SOUTHALLS' STANDARD POWDERS

For ANALYSTS and PHARMACISTS.

IN view of the present-day wide-spread adulteration of powdered drugs, and in order to supply a recognised need of candidates for the Microscopic Examination in Foods and Drugs of the Institute of Chemistry, we have introduced the above collections.

The object of the collection is to supply a series of "Standard Powdered Foods and Drugs," which the analyst or pharmacist may have beside him as an absolute criterion of purity when examining doubtful samples, and which should prove of the greatest value to public analysts, students, and all concerned with the microscopical examination of food and drugs.

The need of a collection of such standards is well shown by the numerous enquiries received from all parts, sets having been supplied to analysts and institutions at home and in New Zealand, Australia, the United States, etc.

Full particulars, with lists of contents, free on application.

PRESS NOTICES

THE ANALYST, *October*, 1905:—"Will be found very useful when a microscopical examination of a doubtful specimen has to be made."

THE CHEMIST AND DRUGGIST, *August 12th*, 1905:—"We are sure that Messrs. Southall have taken pains to supply genuine samples, upon which the utmost reliance can be placed."

THE PHARMACEUTICAL JOURNAL, *August 5th*, 1905:—"Should prove of very great value to candidates for the microscopical examination in foods and drugs in the Institute of Chemistry."

GUARANTEE OF QUALITY.

ALL Tinctures, Infusions, Liquid Extracts, and in fact most of the Galenicals we supply are Standardised by our special methods, full particulars of percentage contents being in most instances given on the label.

When we label a drug or preparation B.P. we take full responsibility for its quality, and are prepared to stand by the fact that it is as labelled when it leaves our warehouse, and similarly we guarantee all official preparations to be in accordance with the descriptions on the labels.

SOUTHALLS'
ORGANIC MATERIA MEDICA.

BY

JOHN BARCLAY, B.Sc. (Lond.), F.C.S.

SEVENTH EDITION.

REVISED AND ENLARGED BY
ERNEST W. MANN,
Pharmaceutical Chemist,
SOMETIME EXTERNAL EXAMINER IN MATERIA MEDICA AND PHARMACY
TO THE UNIVERSITY OF BIRMINGHAM.

LEADING TEACHERS IN PHARMACY GIVE THEIR OPINIONS OF THE NEW EDITION:—

> "This most up-to-date work maintains its position as the most precise and concise work of its kind."
>
> "I find the matter and arrangement most suitable for my work."
>
> "An excellent book in every respect."
>
> "Has been considerably improved."
>
> "It is an excellent book, well up to the present state of knowledge of medicinal drugs, and unsurpassed for the Medical and Pharmaceutical Student."

PRICE SEVEN SHILLINGS AND SIXPENCE NETT.

LONDON:
J. & A. CHURCHILL,
7, GREAT MARLBOROUGH STREET, W.
1909

PRIVATE PRESS OF
SOUTHALL BROS. & BARCLAY, Ltd.